

WHAT WE CLAIM IS:

1. A system for detecting defects in coatings comprising:
  - a) a temperature manipulation apparatus configured to change the temperature of a surface;
  - b) an infrared sensor configured to measure the change in temperature of said surface; and
  - c) a processor configured to compare said measured change in temperature of said surface to an expected change of temperature.
2. The system of claim 1, wherein said system further comprises an application apparatus configured to apply a coating to said surface.
3. The system of claim 1, wherein said system further comprises multiple coating stations configured to apply a coating to said surface.
4. The system of claim 1, wherein said surface comprises a coating.
5. The system of claim 1, wherein said system further comprises a plurality of coating stations having associated sensors.
6. The system of claim 1, wherein said processor is further configured to compare radiation emitted by said surface to a thermal signature and an acceptable preexisting model profile.

7. The system of claim 1, wherein said processor is further configured to generate signals for transmission to an application apparatus to correct a detected defect.
8. The system of claim 1, wherein said expected change of temperature may be calculated based upon a known thermal effusivity value for said surface and said defect.
9. A method for detecting defects in coatings comprising the steps of:
- a) measuring a thermal profile of a surface to create a thermal signature;
  - b) applying a first coating to said surface;
  - c) taking a first measurement of radiation emitted from said surface and said first coating as the temperature thereof is changing;
  - d) comparing said emitted radiation to said thermal signature;
  - e) applying a second coating to said first coating;
  - f) taking a second measurement of emitted radiation from said surface and said first and second coatings as the temperature thereof is changing; and
  - g) comparing said first measurement to said second measurement.

10. The method for detecting defects in coatings as in claim 9, further comprising the steps of:

- a) configuring an expected change of temperature;
- b) manipulating the temperature of said surface and coatings;
- c) measuring the change of temperature or adjacent areas in said surface and coatings; and
- d) comparing said measured change of temperature in said surface and coatings to said expected change of temperature.

11. The method for detecting defects in coatings as in claim 9, further comprising the step of comparing said first measurement of radiation emitted from said surface and said first coating to a first acceptable preexisting model profile.

12. The method for detecting defects in coatings as in claim 9, further comprising the step of comparing said second measurement of emitted radiation to a second acceptable preexisting model profile.

13. The method for detecting defects in coatings as in claim 9, further comprising the step of localizing said defects upon comparison of said first measurement to said second measurement.

14. The method for detecting defects in coatings as in claim 9, further comprising the step of correcting an identified defect.

15. A method for detecting defects in coatings comprising the steps of:

- a) applying a plurality of coatings to a surface;
- b) assigning a thermal effusivity value to each of said coatings;
- c) configuring an expected change of temperature for said surface coatings;
- d) manipulating the temperature of said surface and coatings;
- e) measuring the change of temperature in said manipulated surface and coatings; and
- f) comparing said measured change of temperature in said manipulated surface and coatings to said expected change of temperature.

16. The method for detecting defects in coatings as in claim 15, further comprising the steps of:

- a) measuring a thermal profile of said surface to create a thermal signature;
- b) taking a first measurement of radiation emitted from said surface and a first of said coatings;
- c) comparing said emitted radiation to said thermal signature;
- d) taking a second measurement of emitted radiation from said surface and a second of said coatings; and
- e) comparing said first measurement to said second measurement.

17. The method for detecting defects in coatings as in claim 15, further comprising the step of localizing said defects upon comparison of said measured change of temperature in said manipulated surface and coatings to said expected change of temperature.
18. The method for detecting defects in coatings as in claim 15, further comprising the step of correcting a defect indicated upon comparison of said measured change of temperature in said manipulated surface and coatings to said expected change of temperature.
19. The method for detecting defects in coatings as in claim 15, further comprising the step of implementing a change in the operation of an application apparatus to address one or more defects detected.
20. A method for detecting defects in coatings comprising the steps of:
- a) measuring a thermal profile of a surface to create a thermal signature;
  - b) applying a first coating to said surface;
  - c) changing the temperature of said surface and said first coating;
  - d) taking a first measurement of amount of radiation emitted from said surface and said coating as their temperature changes;
  - e) comparing said radiation emitted to said thermal signature;
  - f) applying a second coating to said first coating;
  - g) changing the temperature of said surface and said first and second coating;

- h) taking a second measurement of amount of radiation emitted from said surface and said first and second coatings as their temperature changes;
- i) measuring change in temperature of said surface and said first and second coatings;
- j) configuring an expected change of temperature;
- k) comparing said first measurement to said second measurement; and
- l) comparing said measured change in temperature of said surface and said first and second coatings to said expected change of temperature.

21. The method for detecting defects in coatings as in claim 20, further comprising the step of comparing said first measurement of radiation emitted from said surface and said first coating to a first acceptable preexisting model profile.

22. The method for detecting defects in coatings as in claim 20, further comprising the step of comparing said second measurement of radiation emitted from said surface and said first and second coatings to a second acceptable preexisting model profile.

23. The method for detecting defects in coatings as in claim 20, further comprising the step of localizing said defects upon comparison of said first measurement to said second measurement and said measured change of temperature in said surface and coatings to said expected change of temperature.

24. The method for detecting defects in coatings as in claim 20, further comprising the step of correcting a defect indicated upon comparison of said first measurement to said second measurement and said measured change of temperature in said manipulated surface and coatings to said expected change of temperature.

25. The method for detecting defects in coatings as in claim 20, further comprising the step of implementing a change in the operation of an application apparatus to address one or more defects detected.

26. A method for detecting defects in coatings comprising the steps of:

- a) creating a temperature differentiation between a surface and a first coating;
- b) applying said first coating to said surface;
- c) measuring change in temperature of said surface and said first coating;
- d) configuring an expected change of temperature; and
- e) comparing said measured change in temperature of said surface and said first coating to said expected change of temperature.

27. The method for detecting defects in coatings as in claim 26, further comprising the steps of:

- a) measuring a thermal profile of said surface to create a thermal signature;
- b) taking a first measurement of amount of radiation emitted from said surface and said first coating;
- c) comparing said radiation emitted to said thermal signature;

- d) creating a temperature differentiation between said surface, said first coating and a second coating;
- e) applying a second coating to said first coating;
- f) taking a second measurement of amount of emitted radiation from said surface and said first and second coatings; and
- g) comparing said first measurement to said second measurement.

28. The method for detecting defects in coatings as in claim 26, further comprising the step of localizing said defects upon comparison of said measured change of temperature in said surface and coating to said expected change of temperature.

29. The method for detecting defects in coatings as in claim 26, further comprising the step of correcting a defect indicated upon comparison of said measured change of temperature in said surface and coating to said expected change of temperature.

30. The method for detecting defects in coatings as in claim 26, further comprising the step of changing, in real time, the operator of an application apparatus upon induction of a defect.